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ABSTRACT

In its phase one report, MGT of America, Inc., a management research and consulting firm, recommended several improvements in the funding model used by the North Carolina State Board of Community Colleges. In addition to an overall call for a simplified approach to presenting the financial needs of the 58 colleges, the report identified several aspects of the current funding model that required further review, two of which were the sliding scale for curriculum instruction (SSCI) and the base staffing/base funding provision for instructional and administrative support (BSBF). Each issue attempts to address the concept of "economy of scale," a business term that, when applied to higher education, implies that per-student cost is expected to be lower at a larger college than at a smaller college. The existence of this economy of scale phenomenon presents a special challenge to the NCCCS. The state operates an unusually high proportion of colleges in the smaller enrollment categories--29% of the state's community colleges enroll fewer than 1,000 full-time equivalent students, compared with only 21% regionally, and 15% nationally. This report describes the current funding formula for SSCI and BSBF, discussing their rationale, fiscal impact, evidence of economy of scale in other states, trends, and recommendations. The report ends with a "Next Steps" section, which outlines general areas for further review. Appended are selected excerpts from the MGT report. (EMH)

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ED 464 667

# ECONOMY OF SCALE SUPPLEMENTAL REPORT:

# ASSESSMENT OF THE FUNDING FORMULA USED BY THE NORTH CAROLINA COMMUNITY COLLEGE SYSTEM

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**SUBMITTED TO:**

**STATE BOARD OF COMMUNITY COLLEGES**
**200 WEST JONES STREET**
**RALEIGH, NORTH CAROLINA 27603**

**SUBMITTED BY:**

**MGT OF AMERICA, INC.**
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**APRIL 18, 1997**

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APPENDIX: Selected Excerpts From Phase I Report

# 1.0 BACKGROUND

# 1.0 BACKGROUND

In its phase one report entitled "Assessment of the Funding Formula Used by the North Carolina Community College System," MGT recommended several improvements in the funding model used by the State Board of Community Colleges. In addition to an overall call for a simplified approach to presenting the financial needs of the 58 colleges, the report recommended parity in funding for occupational extension instruction and basic skills/literacy instruction with curriculum instruction programs. Appendix A contains a summary of those recommendations that were approved by the State Board of Community Colleges on January 17, 1997, for immediate implementation.

The MGT report also identified several aspects of the current funding model that required further review. The two issues that perhaps had the highest priority for immediate attention were:

- the sliding scale for curriculum instruction
- the base staffing / base funding provision for instructional and administrative support.

Each of these features of the current funding formula attempted to address in its own way the concept of "economy of scale."

## 1.1 Economy of Scale

The concept of economy of scale refers to the phenomenon whereby the unit cost of producing a good or service decreases as the number of units produced (i.e., the scale of the operation) increases. This relationship has been established over the years in a variety of private- and public-sector settings. As applied to higher education, the economy of scale concept implies that the per-student cost would be expected to be lower at a larger college than at a smaller college.

In 1986, Brinkman and Leslie ("Economies of Scale in Higher Education: Sixty Years of Research," *The Review of Higher Education*, vol. 10, no. 1) reported on their summary analysis of numerous articles related to economy of scale for colleges and universities. They found that the authors of the other studies "seem to agree that the largest portion of any size-related economies of E&G expenditures at two-year colleges is typically realized by the time institutional enrollment is in the range of 1,000 to 1,500 FTE students" (p.13). After finding that the data for institutions with larger enrollments was inconclusive, Brinkman and Leslie conclude that "(o)nly small institutions seem to need to be concerned with possible effects of overall institutional effects of size on per-student costs" (p. 23).

The existence of the economy of scale phenomenon presents a special challenge to the North Carolina Community College System. As noted in our Phase 1 report, the State operates an unusually high proportion of colleges in the smaller enrollment categories. Exhibit 1-1 shows that 29 percent of the State's community colleges enroll fewer than 1,000 full-time-equivalent (FTE) students, compared to only 21 percent regionally, and 15 percent nationally.

**EXHIBIT 1-1**
**COUNT OF TWO YEAR PUBLIC INSTITUTIONS BY FTE RANGE**
**NORTH CAROLINA, SREB, AND U.S.**

| FTE Range | North Carolina | | | SREB excl. NC | | | US excl. NC | | |
|---|---|---|---|---|---|---|---|---|---|
| | Count | % of Total | Cum. % | Count | % of Total | Cum. % | Count | % of Total | Cum. % |
| -- 500 | 2 | 3.4% | 3.4% | 17 | 5.2% | 5.2% | 29 | 3.7% | 3.7% |
| 501 - 600 | 3 | 5.2% | 8.6% | 6 | 1.8% | 7.1% | 9 | 1.2% | 4.9% |
| 601 - 700 | 2 | 3.4% | 12.1% | 13 | 4.0% | 11.0% | 20 | 2.6% | 7.5% |
| 701 - 800 | 4 | 6.9% | 19.0% | 9 | 2.8% | 13.8% | 20 | 2.6% | 10.1% |
| 801 - 900 | 0 | 0.0% | 19.0% | 12 | 3.7% | 17.5% | 18 | 2.3% | 12.4% |
| 901 - 1,000 | 6 | 10.3% | 29.3% | 10 | 3.1% | 20.6% | 22 | 2.8% | 15.2% |
| 1,001 - 1,100 | 3 | 5.2% | 34.5% | 10 | 3.1% | 23.6% | 15 | 1.9% | 17.1% |
| 1,101 - 1,200 | 6 | 10.3% | 44.8% | 10 | 3.1% | 26.7% | 17 | 2.2% | 19.3% |
| 1,201 - 1,300 | 1 | 1.7% | 46.6% | 11 | 3.4% | 30.1% | 22 | 2.8% | 22.2% |
| 1,301 - 1,400 | 2 | 3.4% | 50.0% | 10 | 3.1% | 33.1% | 20 | 2.6% | 24.7% |
| 1,401 - 1,500 | 2 | 3.4% | 53.4% | 11 | 3.4% | 36.5% | 19 | 2.4% | 27.2% |
| 1,501 - 1,750 | 6 | 10.3% | 63.8% | 20 | 6.1% | 42.6% | 47 | 6.1% | 33.2% |
| 1,751 - 2,000 | 3 | 5.2% | 69.0% | 27 | 8.3% | 50.9% | 57 | 7.3% | 40.6% |
| 2,001 - 2,250 | 5 | 8.6% | 77.6% | 23 | 7.1% | 58.0% | 48 | 6.2% | 46.8% |
| 2,251 - 2,500 | 3 | 5.2% | 82.8% | 18 | 5.5% | 63.5% | 38 | 4.9% | 51.7% |
| 2,501 - 2,750 | 1 | 1.7% | 84.5% | 7 | 2.1% | 65.6% | 29 | 3.7% | 55.4% |
| 2,751 - 3,000 | 2 | 3.4% | 87.9% | 8 | 2.5% | 68.1% | 24 | 3.1% | 58.5% |
| 3,001 - 5,000 | 5 | 8.6% | 96.6% | 47 | 14.4% | 82.5% | 148 | 19.1% | 77.6% |
| > 5,000 | 2 | 3.4% | 100.0% | 57 | 17.5% | 100.0% | 174 | 22.4% | 100.0% |
| **Total** | **58** | **100.0%** | | **326** | **100.0%** | | **776** | **100.0%** | |

Note: Does not include Kentucky 2-year public institutions - data not available.
Source: NCES 1994-95 IPEDS.

## *1.2 Approach for Consideration of Economy of Scale*

As it reviewed the issues related to recognition of economy of scale in the funding formulas used by the North Carolina Community College System (NCCCS), the consulting team and the Funding Study Advisory Committee discussed five sets of questions in sequential order. The questions, and the consensus response to each, are listed below.

1. Does the economy of scale phenomenon occur in community colleges within the enrollment range found in the NCCCS? What is acceptable evidence of existence or non-existence (e.g., national averages, detailed analysis of service delivery in selected NCCCS institutions, etc.)?

   *Based on our review of the research literature and our examination of more recent expenditure data, we conclude that many colleges in the NCCCS are likely to experience difficulty in achieving economy of scale at their current enrollment levels.*

2. If economy of scale exists in the NCCCS, should it be the policy of the State to provide recognition of lack of economy of scale in its funding model? What is the rationale?

   *The State has a long-standing policy to provide convenient geographic access for its citizens to community college programs. Although some have questioned the need for 58 colleges from time to time, the State's access policy has always been reaffirmed. Therefore, this funding study accepts as a "given" that all 58 colleges will continue to exist. Since the smaller colleges do not enjoy the benefits of economy of scale, the constituents of these colleges are at risk of reduced and/or lower quality programming unless the formula provides appropriate recognition.*

3. If economy of scale exists and is to be recognized, does it occur in the instructional area, the support area, or both? Should it be recognized in each place it occurs or in a single, composite calculation?

   *Our analyses confirm the findings in the research literature that economy of scale exists in both the instructional and support areas, although its impact is much greater in the support area.*

4. If economy of scale exists and is to be recognized, what is an appropriate range of supplemental funding amounts? What is acceptable evidence that the amounts are appropriate?

   *Our analyses focused on current expenditure patterns in the national population of community colleges to provide the basis for determining the amount of supplemental funding that may be needed.*

5. Once a decision has been made to provide funding for lack of economy of scale and the general range of dollar amounts is known, what is the best formula format to use?

   *The response to this question will be guided by the overall goal of achieving as simple a formula presentation as possible.*

The remaining two sections of this supplemental report will focus first on provisions for recognizing economy of scale in the instruction area, and then will consider support programs.

## 2.0 SLIDING SCALE TREATMENT FOR INSTRUCTION

# 2.0 SLIDING SCALE TREATMENT FOR INSTRUCTION

## 2.1 Description of Current Formula for Curriculum Instruction

The current formula for curriculum instruction is based on the construct of the "instructional unit." Although in many ways an instructional unit is essentially the same as a regular teaching position, resources available for instructional units can also be used for part-time and temporary personnel as well as for other purposes. The four major steps in the curriculum instruction formula are as follows:

1. determination of the number of budgeted FTE students,
2. derivation of the number of instructional units by dividing the count of budgeted FTE students by a sliding scale of student:faculty ratios,
3. calculation of instructional personnel dollars required by multiplying the appropriated unit value times the number of instructional units, and
4. calculation of other cost (classroom support) dollars required by multiplying the count of budgeted FTE students times the appropriated other cost rate.

The rates used in the System's 1996-97 appropriation for curriculum instruction are shown in Exhibit 2-1.

## 2.2 Rationale for Current Treatment

The sliding scale of student:faculty ratios was first implemented with the 1995-96 allocation. The sliding scale has its origin in a 1994-95 program cost study, and the several tiers of student:faculty ratios were intended to recognize the smaller class sizes that are required by all colleges to offer certain instructional programs. The conclusion from that study, in effect, was that smaller colleges were forced to operate a higher proportion of their classes with smaller classes due to an insufficient number of students to permit large class sections.

**EXHIBIT 2-1**
**DESIGN OF THE FUNDING MODEL FOR**
**CURRICULUM INSTRUCTIONAL PROGRAMS**
**1996-97**

| | |
|---|---|
| ■ Instructional Units (Sliding Scale Factor) | |
| One Unit per 17 FTE Students for First 250 Students<br>One Unit per 18 FTE Students for Next 125 Students<br>One Unit per 19.5 FTE Students for Next 125 Students<br>One Unit per 21.55 FTE Students in Excess of 500 Students | |
| ■ Appropriated Value of Instructional Unit | $40,119 |
| ■ Employee Benefits | |
| Based on Appropriated Levels | |
| Social Security/Retirement | 18.48% |
| Hospitalization (per position) | $1,735 |
| ■ Other Costs | |
| Rate Per Curriculum FTE Student<br>Based on Appropriated Enrollment Levels | $105 |

It is important to note that the sliding scale recommendation from the 1994-95 study has yet to be fully implemented. As originally envisioned, the student:faculty ratios were to be as follows:

| FTE Enrollment Range | Student: Faculty Ratio |
|---|---|
| 0-1,000 | 17:1 |
| 1,001-1,500 | 18:1 |
| 1,501-2,000 | 19.5:1 |
| Above 2,000 | 21:1 |

Had these ratios been funded, a larger proportion of students in the middle- and larger-sized colleges would have been funded for smaller class sizes.

## 2.3 *Fiscal Impact of Sliding Scale*

Although much of the discussion concerning the sliding scale and its impact has been expressed in terms of how much it has "cost" the large institutions, the implementation of the lower student:faculty ratios was funded with an additional

appropriation to the System for this specific purpose. Since the staffing ratio for the highest size category (now at 21.55:1) is lower than the previous uniform ratio for all size categories (then at 21.6:1), each college actually experienced an increase in funding from the adoption of the sliding scale. It is unclear whether these new monies would have been appropriated to the System without the recommendation for the sliding scale.

The debate, then, really concerns the equity of how the new monies for lower student:faculty ratios are allocated. As shown in Exhibit 2-2, a relatively small proportion of total instructional dollars are shifted from one institution to another due to the sliding scale. Generally, the shifts permit a significant increase in the budgets of the smallest colleges, with the colleges that have enrollments greater than 2,000 FTE forfeiting only 1-2 percent of their potential allocations for curriculum instruction. Overall, 21 large colleges shift just under $3.5 million to the smaller schools through the sliding scale.

## *2.4 Evidence of Economy of Scale in Other States*

In an effort to determine whether the differences in funding rates for small and large colleges is appropriate, we examined per-student instructional costs in other states. Given the results of 60 years of research described above, the not-surprising finding is that expenditures per student in 1994-95 decreased as the size of the college increased. The findings from this analysis of approximately 800 colleges in the other 49 states is shown graphically in Exhibit 2-3.

## EXHIBIT 2-2
## ANALYSIS OF FISCAL IMPACT OF SLIDING SCALE FOR CURRICULUM INSTRUCTION PROGRAMS

| College | Instruction $ | | | |
|---|---|---|---|---|
| | Budgeted Curriculum FTE | Current "Sliding Scale" Budget | Equal Rate per Curriculum FTE | Amount Shifted |
| Pamlico CC | 148 | 444,173 | 375,198 | 68,975 |
| Tri-County CC | 553 | 1,560,745 | 1,393,233 | 167,512 |
| Montgomery CC | 568 | 1,596,808 | 1,429,296 | 167,512 |
| Mayland CC | 622 | 1,725,648 | 1,567,990 | 157,658 |
| Bladen CC | 644 | 1,777,226 | 1,624,495 | 152,731 |
| Martin CC | 652 | 1,797,774 | 1,645,042 | 152,731 |
| Brunswick CC | 676 | 1,854,489 | 1,701,757 | 152,731 |
| McDowell TCC | 712 | 1,942,024 | 1,794,220 | 147,805 |
| Roanoke-Chowan CC | 738 | 2,003,876 | 1,860,999 | 142,878 |
| Anson CC | 822 | 2,204,842 | 2,071,818 | 133,024 |
| Sampson CC | 882 | 2,349,093 | 2,220,996 | 128,097 |
| James Sprunt CC | 918 | 2,436,629 | 2,313,459 | 123,170 |
| Richmond CC | 933 | 2,472,692 | 2,349,521 | 123,170 |
| Piedmont CC | 936 | 2,477,934 | 2,359,690 | 118,244 |
| Wilson TCC | 975 | 2,570,711 | 2,457,395 | 113,317 |
| Beaufort County CC | 1,049 | 2,745,993 | 2,642,530 | 103,463 |
| Cleveland CC | 1,058 | 2,771,572 | 2,668,109 | 103,463 |
| Blue Ridge CC | 1,109 | 2,890,244 | 2,796,635 | 93,610 |
| Randolph CC | 1,118 | 2,910,896 | 2,817,287 | 93,610 |
| Mitchell CC | 1,124 | 2,926,307 | 2,832,697 | 93,610 |
| Carteret CC | 1,141 | 2,967,506 | 2,873,897 | 93,610 |
| Nash CC | 1,173 | 3,044,769 | 2,956,086 | 88,683 |
| Haywood CC | 1,212 | 3,137,546 | 3,053,791 | 83,756 |
| Stanly CC | 1,233 | 3,189,020 | 3,105,264 | 83,756 |
| Halifax CC | 1,238 | 3,199,398 | 3,120,569 | 78,829 |
| Isothermal CC | 1,256 | 3,240,703 | 3,166,801 | 73,902 |
| Southwestern CC | 1,280 | 3,302,345 | 3,223,516 | 78,829 |
| Robeson CC | 1,289 | 3,322,997 | 3,249,095 | 73,902 |
| Wilkes CC | 1,380 | 3,539,478 | 3,480,357 | 59,122 |
| College of Albemarle | 1,401 | 3,590,952 | 3,531,830 | 59,122 |

| College | Instruction $ | | | |
|---|---|---|---|---|
| | Budgeted Curriculum FTE | Current "Sliding Scale" Budget | Equal Rate per Curriculum FTE | Amount Shifted |
| Edgecombe CC | 1,413 | 3,616,846 | 3,562,651 | 54,195 |
| Rockingham CC | 1,452 | 3,709,623 | 3,660,355 | 49,268 |
| Southeastern CC | 1,573 | 4,003,157 | 3,963,743 | 39,415 |
| Western Piedmont CC | 1,678 | 4,250,669 | 4,230,962 | 19,707 |
| Lenoir CC | 1,771 | 4,472,288 | 4,462,434 | 9,854 |
| Davidson County CC | 1,802 | 4,549,445 | 4,539,591 | 9,854 |
| Craven CC | 1,841 | 4,642,223 | 4,642,223 | - |
| Caldwell CC & TI | 2,013 | 5,054,428 | 5,074,135 | (19,707) |
| Vance-Granville CC | 2,098 | 5,255,499 | 5,289,987 | (34,488) |
| Surry CC | 2,128 | 5,327,625 | 5,362,112 | (34,488) |
| Wayne CC | 2,160 | 5,404,887 | 5,444,301 | (39,415) |
| Rowan-Cabarrus CC | 2,185 | 5,466,634 | 5,506,048 | (39,415) |
| Alamance CC | 2,236 | 5,585,306 | 5,634,574 | (49,268) |
| Sandhills CC | 2,345 | 5,848,018 | 5,912,067 | (64,049) |
| Catawba Valley College | 2,399 | 5,976,859 | 6,045,834 | (68,975) |
| Johnston CC | 2,414 | 6,012,922 | 6,081,897 | (68,975) |
| Central Carolina CC | 2,429 | 6,048,984 | 6,122,887 | (73,902) |
| Cape Fear CC | 2,644 | 6,564,241 | 6,662,778 | (98,536) |
| Asheville-Buncombe TCC | 2,753 | 6,822,027 | 6,940,271 | (118,244) |
| Durham TCC | 2,756 | 6,827,269 | 6,945,513 | (118,244) |
| Coastal Carolina CC | 2,848 | 7,048,782 | 7,176,879 | (128,097) |
| Pitt CC | 2,966 | 7,332,147 | 7,475,025 | (142,878) |
| Forsyth TCC | 3,121 | 7,703,153 | 7,865,738 | (162,585) |
| Gaston College | 3,133 | 7,729,047 | 7,896,559 | (167,512) |
| Wake CC | 4,398 | 10,753,915 | 11,084,012 | (330,097) |
| Guilford TCC | 4,813 | 11,748,366 | 12,127,731 | (379,365) |
| Fayetteville TCC | 5,396 | 13,144,749 | 13,598,017 | (453,267) |
| Central Piedmont CC | 8,857 | 21,420,626 | 22,322,234 | (901,608) |
| **Total** | **106,462** | **268,314,127** | **268,314,127** | **0** |

NOTE: Equal Rate simulations use the system average rate per FTE.



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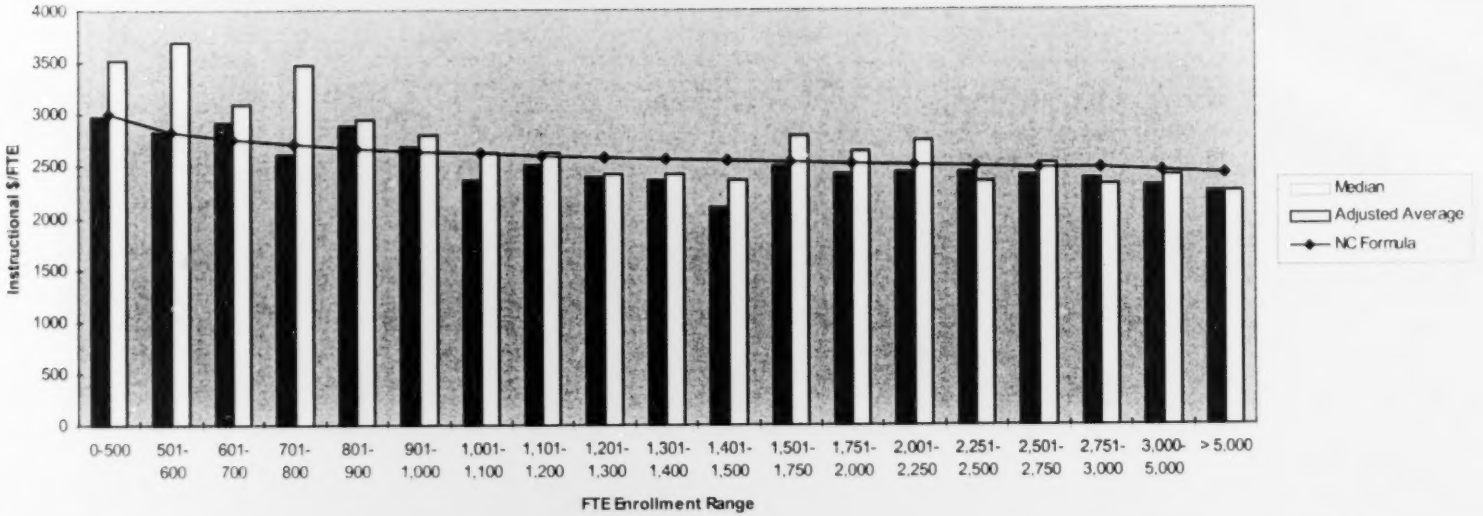
## EXHIBIT 2-3
## INSTRUCTIONAL EXPENDITURES PER FTE STUDENT BASED ON FTE ENROLLMENT RANGES
## MEDIAN, AVERAGE, AND NC FORMULA




Note: Does not Include North Carolina or Kentucky 2 year public schools (data not available for Kentucky).
Adjusted Average corrects for observations in national population with erroneous data.
NC Formula is based on midpoint of range, 7,500 was used for > 5,000 range.
Source: NCES 1994-95 IPEDS.

For each of the 19 college enrollment size categories shown, the instructional expenditures per FTE student in other states is shown in two ways:

- the *median* expenditure per FTE student, where the middle value for all colleges in the size category is shown, and
- the *adjusted average* expenditure per FTE student, where data that is clearly outside a reasonable range (e.g., $3 million per student) was excluded before calculating the average.

Under both methods, a clear downward trend in expenditures per student can be seen as enrollment levels increase.

Superimposed on the bar chart is the plot of a line that represents the treatment in the NCCCS under the current sliding scale formula. The current formula, even though only partially implemented, already appears to recognize economy of scale at about the same rate as the national expenditure data.

## 2.5 *Evidence of Economy of Scale in North Carolina Community Colleges*

As stated above, part of the original justification for the sliding scale treatment in the current formula was the belief that certain programs need to be delivered with lower student:faculty ratios than other programs. A further component of this proposition was that nearly all of the programs at the smaller colleges required lower student:faculty ratios due to the lack of students to make up larger classes. To examine the relative degree to which small class size is attributable to the characteristics of some disciplines that may require one-on-one instruction as opposed to institutional size, we examined the variations in average class size for several popular disciplines by college enrollment.

As shown in Exhibits 2-4a through 2-4j, the average class size increases as the size of the college increases for each of the nine selected disciplines as well as for the all discipline average. The slopes of the regression lines are relatively modest for certain technical fields, and much steeper for arts and sciences programs. These

graphs give credence to the propositions on which the sliding scale was based -- namely, that some disciplines require small class sizes regardless of overall enrollment levels at the host institution, while large colleges can realize economy of scale in certain other disciplines.

**EXHIBIT 2-4A**
**AVERAGE CLASS SIZE BY INSTITUTIONAL SIZE**

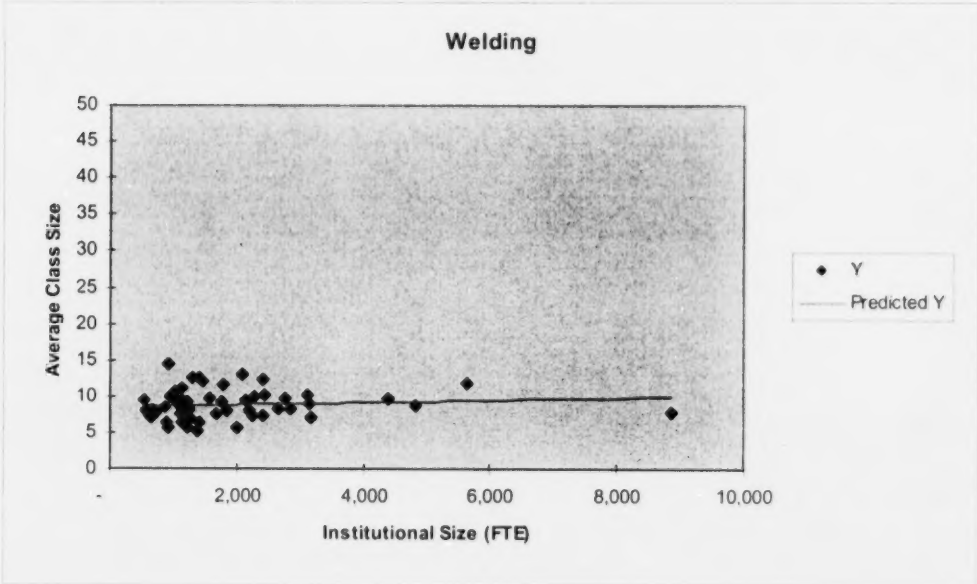


**EXHIBIT 2-4B**
**AVERAGE CLASS SIZE BY INSTITUTIONAL SIZE**

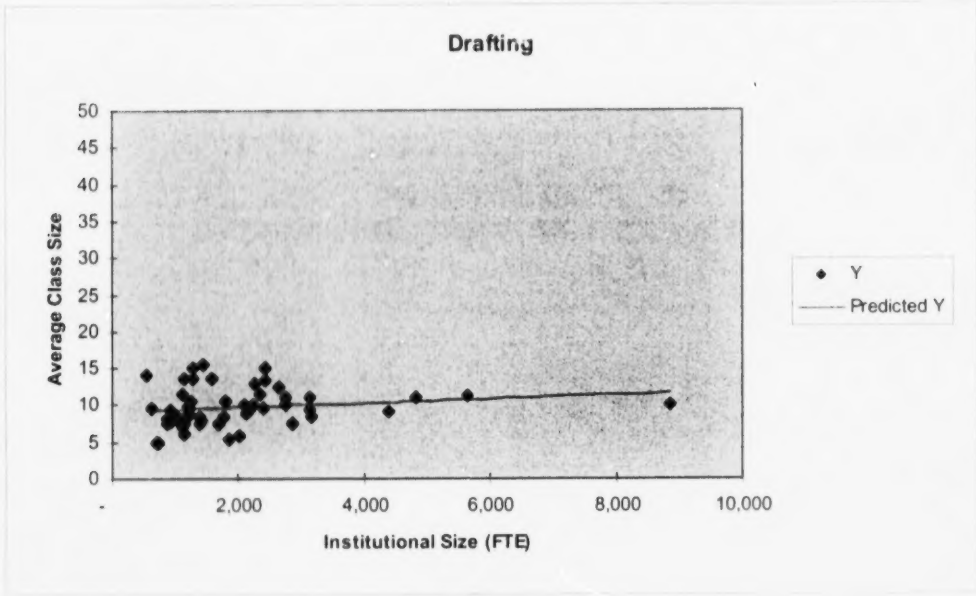



**EXHIBIT 2-4C**
**AVERAGE CLASS SIZE BY INSTITUTIONAL SIZE**

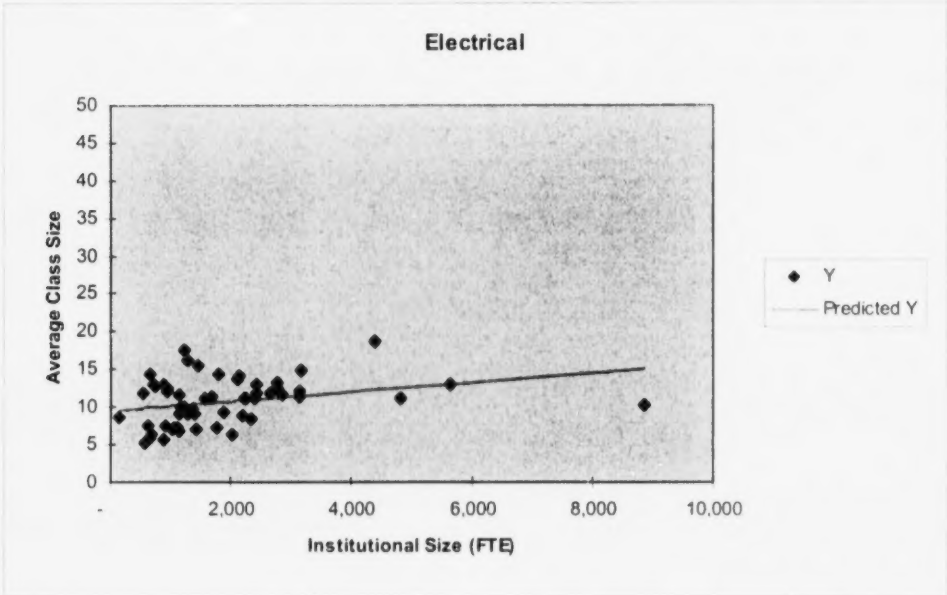


**EXHIBIT 2-4D**
**AVERAGE CLASS SIZE BY INSTITUTIONAL SIZE**

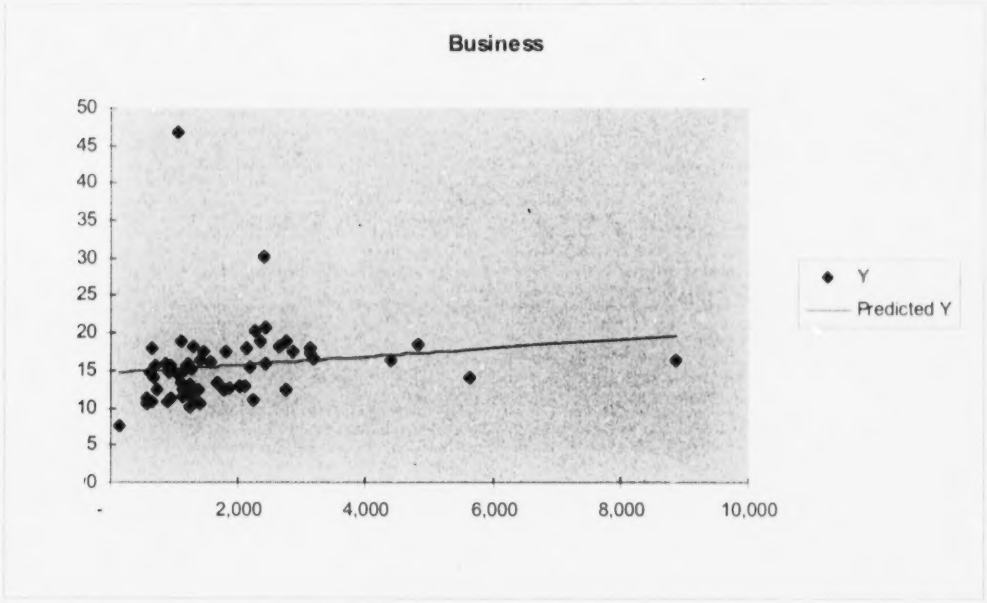



**EXHIBIT 2-4E**
**AVERAGE CLASS SIZE BY INSTITUTIONAL SIZE**

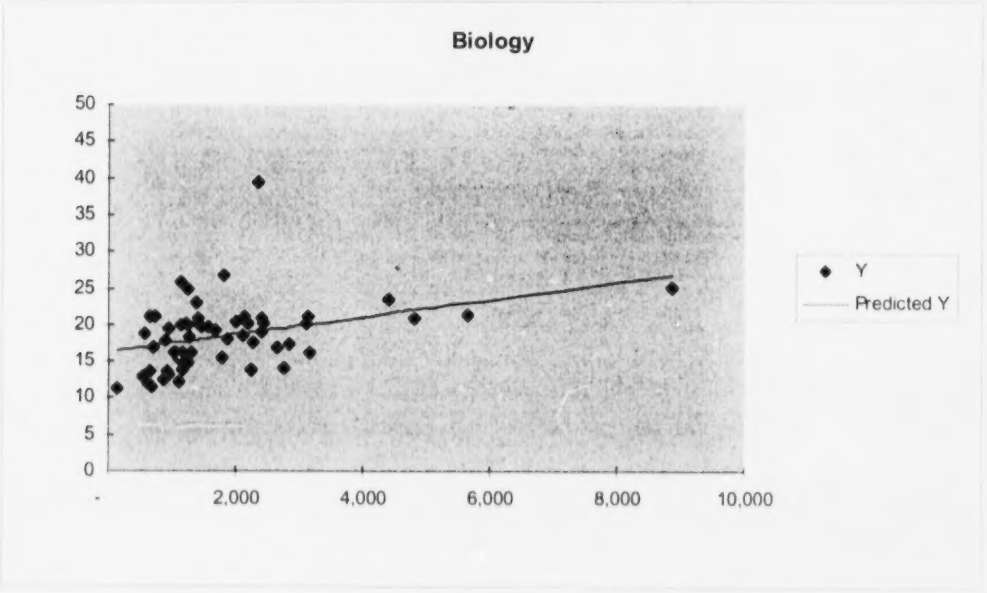


**EXHIBIT 2-4F**
**AVERAGE CLASS SIZE BY INSTITUTIONAL SIZE**

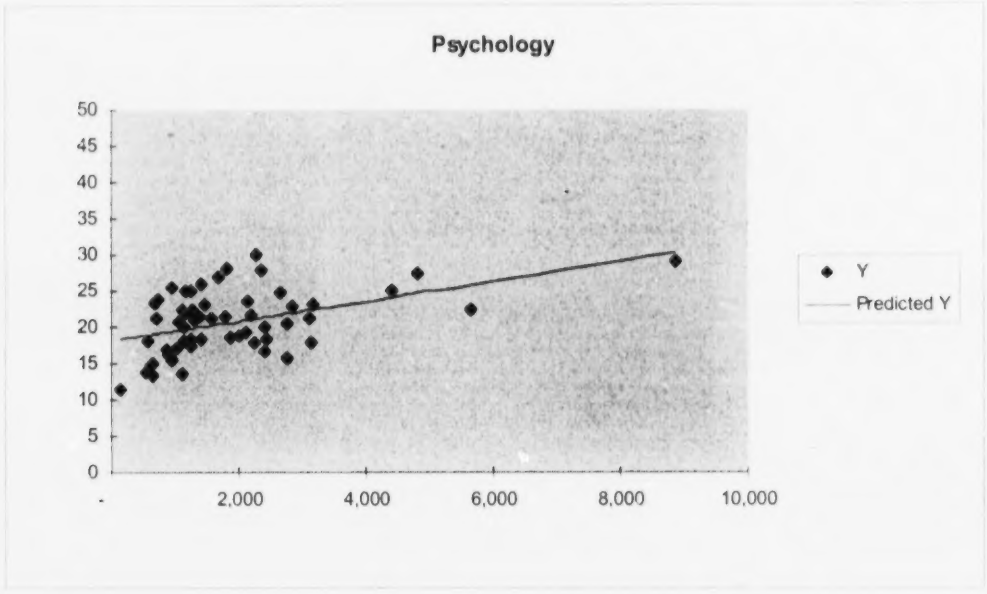



**EXHIBIT 2-4G**
**AVERAGE CLASS SIZE BY INSTITUTIONAL SIZE**

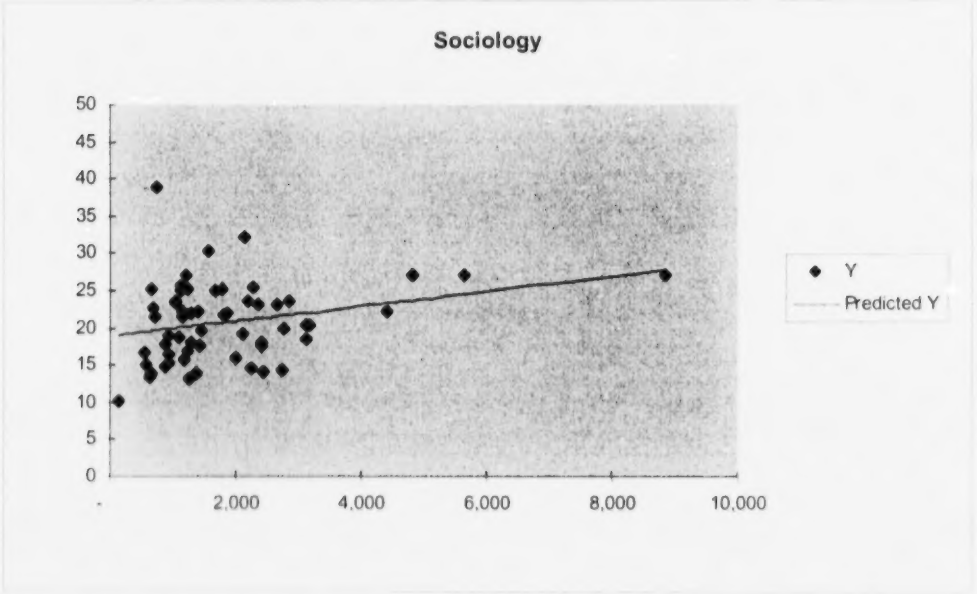


**EXHIBIT 2-4H**
**AVERAGE CLASS SIZE BY INSTITUTIONAL SIZE**

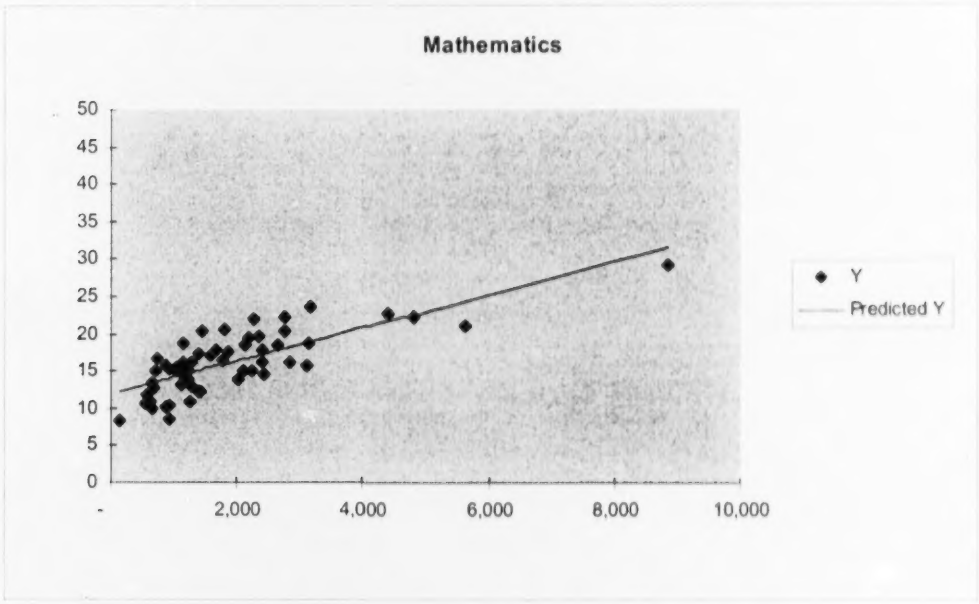



**EXHIBIT 2-4I**
**AVERAGE CLASS SIZE BY INSTITUTIONAL SIZE**

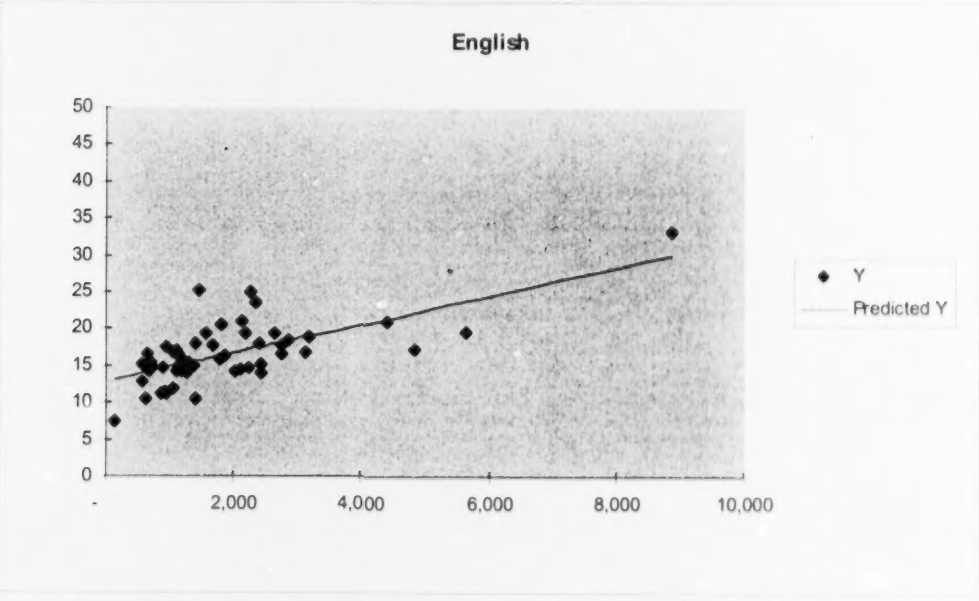
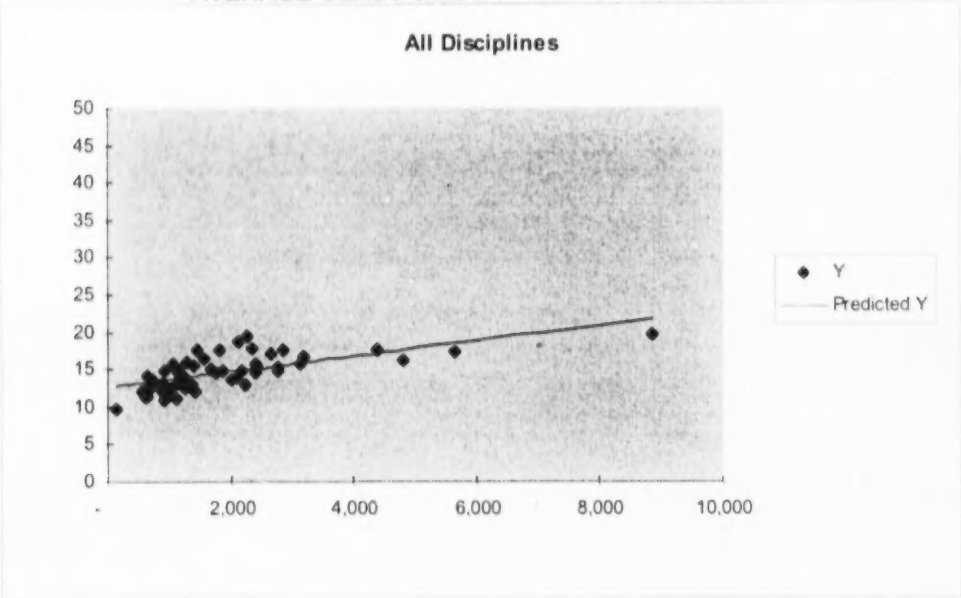


**EXHIBIT 2-4J**
**AVERAGE CLASS SIZE BY INSTITUTIONAL SIZE**




## 2.6 *Recommendations*

Based on the analyses above, we support the continued use of the current sliding scale of student:faculty ratios for curriculum instruction programs. The economy of scale concept -- which is operationalized by the sliding scale of student:faculty ratios -- is supported by an extensive body of research literature, our analyses of recent national expenditure patterns, and our further analyses of the System's own average class size data. For the same reasons that the sliding scale approach is important for curriculum instruction, we renew our earlier recommendation to extend this approach to the formula for occupational extension.

In our analyses of the sliding scale issue, we noted that the formula appears to be unnecessarily complex through its use of different student:faculty ratios for four different enrollment level categories. Three of the four categories only apply to colleges with

fewer than 500 FTE students, yet just one college currently fails to enroll at least this many students. Since the budget allocation for this smallest college is separately negotiated independent of the formula, the first three steps can be consolidated without mathematical (or fiscal) impact. In order to simplify this aspect of the formula presentation, we recommend that the sliding scale be expressed in two steps as follows:

| FTE Enrollment Range | Student: Faculty Ratio |
|---|---|
| 0-500 | 17.80:1 |
| Above 500 | 21.55:1 |

This streamlined two-step calculation will yield the same number of instructional units for each college as the current four-step approach.

# 3.0 BASE STAFFING/BASE FUNDING FOR INSTRUCTIONAL AND ADMINISTRATIVE SUPPORT

# 3.0 BASE STAFFING / BASE FUNDING FOR INSTRUCTIONAL AND ADMINISTRATIVE SUPPORT

## 3.1 Description of Current Formula for Instructional and Administrative Support

The current formula combines a variety of support expenditures under a category known as "instructional and administrative support." Dollars appropriated in this category are used for compensating the president and other campus leaders, counselors, clerical personnel and others.

It is important that this formula component be viewed as more than as a repository for salaries of top college officials. As seen in Exhibit 3-1, only five of the thirty positions funded by the base amount are considered to be "executive management." Nearly two-thirds of these positions are assigned as "instructional support," that is, positions in the library, computing center, student services areas and instructional departments.

**EXHIBIT 3-1**
**DISTRIBUTION OF POSITIONS IN INSTRUCTIONAL AND ADMINISTRATIVE SUPPORT BASE AMOUNT**

| Position Category | Executive Management | Institutional Support | Instructional Support | Total |
|---|---|---|---|---|
| Senior Administration | 5 | | | 5 |
| Supervisor of Programs | | | 2 | 2 |
| Student Support Services | | | 6 | 6 |
| General Institution | | 1 | 3 | 4 |
| Technical/Paraprofessional | | 1 | 4 | 5 |
| Clerical | | 4 | 4 | 8 |
| Total | 5 | 6 | 19 | 30 |

The current formulas for this component identify 30 specific positions to be funded at each college and then associate an appropriate salary and benefits rate for each position. Base allowances for "other costs," such as office supplies, printing and distribution of course schedules, etc., are also provided. The formula further includes a

per-student rate for all enrollment in excess of 750 FTE. The rates used in the 1996-97 appropriation are listed in Exhibit 3-2.

**EXHIBIT 3-2**
**COMPONENTS OF THE FUNDING MODEL**
**FOR SUPPORT PROGRAMS**
**1996-97**

| | |
|---|---|
| ■ President's Allotment | |
| – Salary based on statewide salary schedule | |
| – Employee benefits | |
| Based on appropriated levels | |
| Social Security/Retirement | 18.48% |
| Hospitalization (per position) | $1,735 |
| ■ Administrative and Instructional Support | |
| – Base allotment per college (based on first 750 FTE) | |
| • Administrative Support | |
| ◊ Salaries | |
| Approved positions per college | 10 positions |
| ◊ Employee Benefits | |
| Social Security/Retirement | 18.48% |
| Hospitalization (per position) | $1,735 |
| ◊ Other Costs | |
| Base amount per college | $20,000 |
| • Instructional Support | |
| ◊ Salaries | |
| Approved positions per college | 19 positions |
| ◊ Employee Benefits | |
| Social Security/Retirement | 18.48% |
| Hospitalization (per position) | $1,735 |
| ◊ Other Costs | |
| Base amount per college | $100,000 |
| – Enrollment allotment per college | |
| Each FTE in excess of 750 FTE | |
| Generate additional funds | $889 per FTE |

## 3.2 *Rationale for Current Treatment*

The current formula for instructional and administrative support has been in place since 1994-95, when it replaced a previous formula that shared many of the same

concepts related to economy of scale. The current formula was designed to identify the basic number of positions that would be required to "open the doors" of a college with 750 FTE students in its combined credit and non-credit programs. The 750-student threshold was selected since all but a handful of the colleges at the time had reached this scale of operation.

In a very specific way, the formula recognizes that every college -- regardless of its size -- needs a president, a chief instructional officer, a finance officer, a librarian, a student affairs officer and a small cadre of other staff. The formula further provides resources to employ additional staff to serve the requirements of larger student populations.

Just as with the partially implemented sliding scale for instruction, the base allowance for a president and 29 other positions represents less than full funding of an earlier proposal from the State Board of Community Colleges. When the study was conducted that lead to the current formula, twice as many support positions were specifically identified as being needed to provide a basic level of college support services.

## 3.3 Fiscal Impact of Base Funding

The 30-position allotment and associated funding provides a significant base of operations for each college. In fact, the majority of colleges in the System receive at least one-half of their support budget through the base funding provision.

As displayed in Exhibit 3-3, the dollar amounts shifted among the colleges to provide the base staffing allowance are significant. As compared to a simulation where each college would receive an equal amount of support dollars per FTE student, many colleges receive several hundred thousand dollars more. Each of the four largest

colleges now receives at least $1 million less than they would under an equal rate approach.

### *3.4 Evidence of Economy of Scale in Other States*

Recognition of the fixed costs of operation in the support areas is a fairly common characteristic of formulas in other states. Exhibit 3-4 summarizes the treatment in the formulas of several other states that belong to the Southern Regional Education Board (SREB).

The approach used for community colleges in Mississippi is similar to the one in North Carolina where a base amount is provided along with a per-student rate. The approaches in four other states rely on the sliding scale technique, where different per-student rates apply to institutions of different enrollment sizes.

## EXHIBIT 3-3
## ANALYSIS OF FISCAL IMPACT OF BASE STAFFING PROVISIONS
## INSTRUCTIONAL AND ADMINISTRATIVE SUPPORT FORMULA

| | Support $ | | | |
|---|---|---|---|---|
| | Budgeted Total FTE | Current "Base Staffing" Budget | Equal Rate per Total FTE | Amount Shifted |
| Pamlico CC | 218 | 1,435,046 | 347,212 | 1,087,834 |
| Tri-County CC | 638 | 1,428,541 | 836,290 | 592,251 |
| Montgomery CC | 688 | 1,432,352 | 899,100 | 533,253 |
| Bladen CC | 746 | 1,439,098 | 974,283 | 464,815 |
| Roanoke-Chowan CC | 921 | 1,588,434 | 1,178,094 | 410,341 |
| Mayland CC | 923 | 1,594,256 | 1,184,497 | 409,759 |
| McDowell TCC | 930 | 1,600,479 | 1,192,756 | 407,722 |
| Martin CC | 933 | 1,595,039 | 1,188,190 | 406,849 |
| Brunswick CC | 975 | 1,635,071 | 1,240,442 | 394,629 |
| Piedmont CC | 1,129 | 1,778,941 | 1,429,120 | 349,821 |
| James Sprunt CC | 1,166 | 1,803,524 | 1,464,468 | 339,056 |
| Anson CC | 1,172 | 1,807,510 | 1,470,201 | 337,310 |
| Sampson CC | 1,284 | 1,916,736 | 1,612,014 | 304,722 |
| Haywood CC | 1,385 | 1,993,056 | 1,717,721 | 275,335 |
| Carteret CC | 1,421 | 2,038,529 | 1,773,668 | 264,861 |
| Wilson TCC | 1,441 | 2,061,485 | 1,802,443 | 259,042 |
| Mitchell CC | 1,443 | 2,053,027 | 1,794,567 | 258,460 |
| Richmond CC | 1,479 | 2,092,184 | 1,844,198 | 247,985 |
| Cleveland CC | 1,512 | 2,117,232 | 1,878,848 | 238,383 |
| Isothermal CC | 1,512 | 2,120,084 | 1,881,701 | 238,383 |
| Beaufort County CC | 1,529 | 2,129,481 | 1,896,044 | 233,437 |
| Nash CC | 1,575 | 2,180,611 | 1,960,558 | 220,053 |
| Stanly CC | 1,584 | 2,174,365 | 1,956,930 | 217,434 |
| Blue Ridge CC | 1,590 | 2,193,715 | 1,978,027 | 215,689 |
| Halifax CC | 1,603 | 2,198,131 | 1,986,224 | 211,906 |
| Randolph CC | 1,609 | 2,203,465 | 1,993,304 | 210,160 |
| Southwestern CC | 1,629 | 2,218,381 | 2,014,040 | 204,341 |
| Edgecombe CC | 1,709 | 2,288,084 | 2,107,020 | 181,064 |
| College of Albemarle | 1,725 | 2,303,725 | 2,127,316 | 176,409 |
| Rockingham CC | 1,757 | 2,336,413 | 2,169,315 | 167,098 |
| Wilkes CC | 1,859 | 2,418,840 | 2,281,419 | 137,420 |
| Southeastern CC | 1,904 | 2,465,720 | 2,341,392 | 124,327 |
| Robeson CC | 1,977 | 2,537,758 | 2,434,671 | 103,087 |
| Western Piedmont CC | 2,198 | 2,734,458 | 2,695,673 | 38,785 |
| Craven CC | 2,229 | 2,751,781 | 2,722,016 | 29,765 |
| Davidson County CC | 2,335 | 2,856,251 | 2,857,328 | (1,077) |
| Lenoir CC | 2,379 | 2,887,995 | 2,901,873 | (13,879) |
| Caldwell CC & TI | 2,533 | 3,019,188 | 3,077,875 | (58,687) |
| Vance-Granville CC | 2,571 | 3,066,055 | 3,135,798 | (69,743) |
| Surry CC | 2,574 | 3,057,069 | 3,127,685 | (70,616) |
| Alamance CC | 2,685 | 3,167,401 | 3,270,314 | (102,913) |
| Rowan-Cabarrus CC | 2,838 | 3,310,047 | 3,457,476 | (147,429) |
| Johnston CC | 2,892 | 3,351,424 | 3,514,565 | (163,141) |
| Wayne CC | 2,898 | 3,355,508 | 3,520,395 | (164,887) |
| Sandhills CC | 2,949 | 3,408,726 | 3,588,452 | (179,726) |
| Catawba Valley College | 2,957 | 3,415,838 | 3,597,891 | (182,054) |
| Cape Fear CC | 3,305 | 3,723,418 | 4,006,725 | (283,308) |
| Asheville-Buncombe TCC | 3,387 | 3,787,154 | 4,094,321 | (307,167) |
| Central Carolina CC | 3,403 | 3,812,082 | 4,123,904 | (311,822) |
| Durham TCC | 3,489 | 3,888,786 | 4,225,630 | (336,844) |
| Pitt CC | 3,500 | 3,896,773 | 4,236,818 | (340,045) |
| Coastal Carolina CC | 3,643 | 4,025,692 | 4,407,344 | (381,652) |
| Gaston College | 3,706 | 4,069,227 | 4,469,210 | (399,983) |
| Forsyth TCC | 4,164 | 4,477,907 | 5,011,150 | (533,242) |
| Wake CC | 5,826 | 5,975,384 | 6,992,202 | (1,016,818) |
| Guilford TCC | 5,857 | 5,991,044 | 7,016,882 | (1,025,838) |
| Fayetteville TCC | 8,786 | 8,599,534 | 10,477,594 | (1,878,060) |
| Central Piedmont CC | 10,313 | 9,969,513 | 12,291,869 | (2,322,355) |
| **Total** | **137,383** | **167,777,563** | **167,777,061** | **502** |

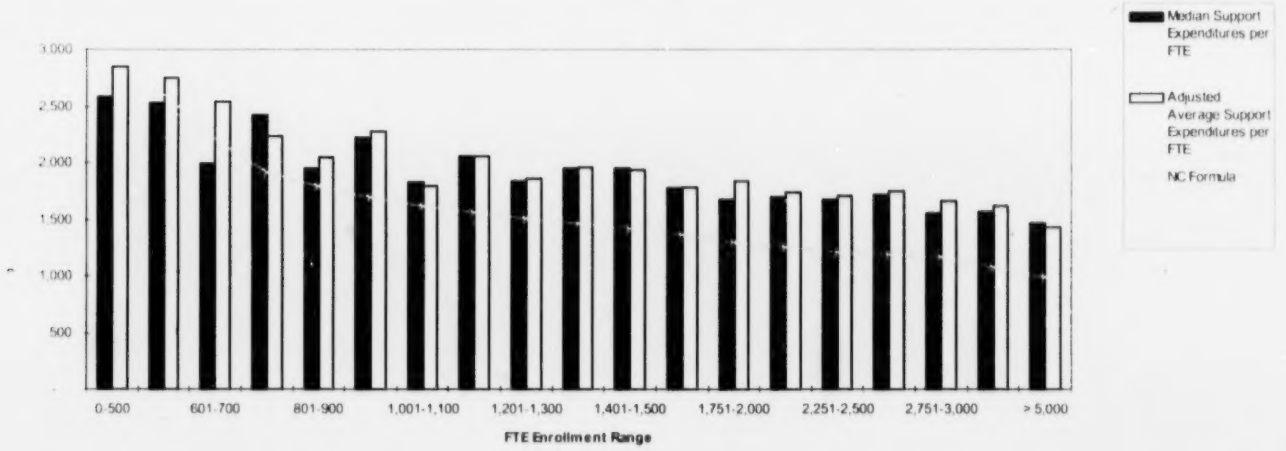
NOTE: Equal Rate simulations use the system average rate per FTE.

**EXHIBIT 3-4**
**ANALYSIS OF ECONOMY OF SCALE FEATURES IN SREB STATE FUNDING FORMULAS FOR GENERAL ADMINISTRATION/STUDENT SERVICES**

| State | General Administration/Student Services |
|---|---|
| Alabama | Headcount less than 4,000:<br>0 - 1,000 @ $654.12<br>1,000 - 2,500 @ $330.38<br>2,500 - 4,000 @ $224.86<br>Headcount greater than 4,000:<br>0 - 4 ,000 @ $371.88<br>4,000 - 8,000 @ $278.50<br>8,000 - up @ $250.50 |
| Arkansas | 0 - 1,500 @ $330<br>1,500 - 5,000 @ $212<br>5,000 - up @ $131 |
| Kentucky | 0 - 4,000 @ $378<br>4,000 - 8,000 @ $282<br>8,000 - up @ $255 |
| Mississippi | Base level plus student service rate per headcount and FTE student |
| South Carolina | 0 - 4,000 @ $150<br>4,000 - 8,000 @ $125<br>8,000 - 12,000 @ $100<br>12,000 - up @ $75 |

We also compared the current North Carolina formula for instructional and administrative support to the actual expenditures in the other 49 states (see Exhibit 3-5). Similar to the exhibit for instructional expenditures in the preceding chapter, both the median and the adjusted average expenditure per FTE student are shown for the other states for the 1994-95 fiscal year. Also illustrated is the plot of the current North Carolina formula as it would apply to institutions at varying enrollment levels. As can be seen in the exhibit, the current formula is reasonably similar to the national pattern for colleges in the 500-900 FTE enrollment range, but provides significantly lower support than the other states for larger institutions.

## EXHIBIT 3-5
## SUPPORT EXPENDITURES PER FTE BASED ON FTE ENROLLMENT RANGES
## MEDIAN, ADJUSTED AVERAGE, AND NC FORMULA




Note: Does not include North Carolina or Kentucky 2 year public schools (data not available for Kentucky).
Adjusted average corrects for observations in national population with erroneous data.
NC Schools less than 500 FTE, support amount is negotiated, not formula driven.
NC Formula is based on midpoint of range, 7,500 was used for > 5,000 range.
NC Formula is a base of $89,981 for president's salary, and $1,345,065 for the first 750 FTE and $889 for each FTE > 750.
Source: NCES 1994-95 IPEDS.

## *3.5 Trends Affecting Instructional and Administrative Support Workload*

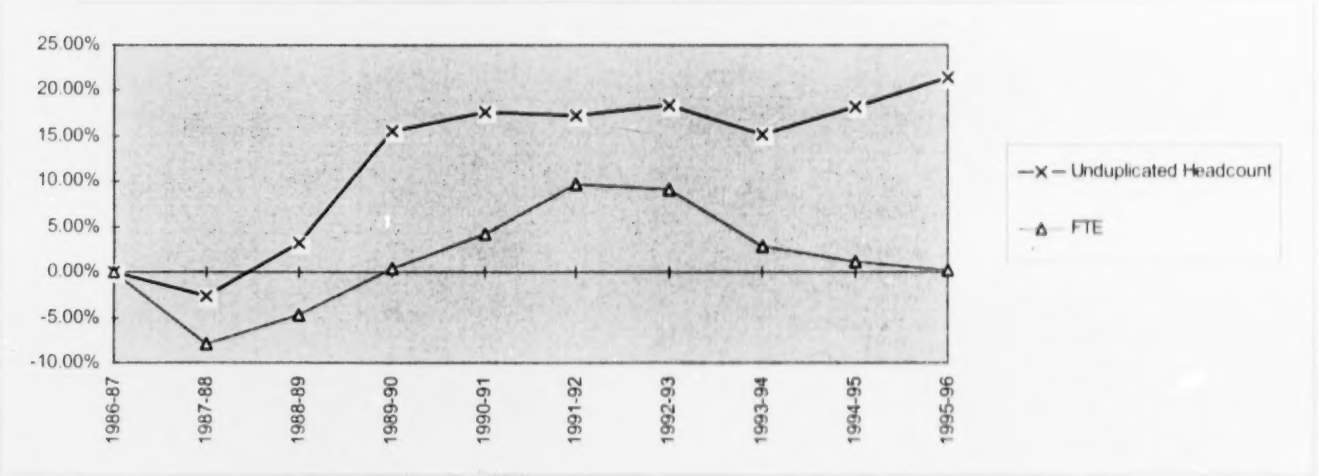
One of the concerns noted in the phase 1 report was that the workload in the instructional and administrative support areas tends to be generated by headcount enrollment (i.e., actual people) as well as FTE enrollment. A part-time student, for instance, can place nearly the same requirements on the registrar as a full-time student.

The importance of this distinction can be appreciated upon review and consideration of Exhibit 3-6. It traces the change in headcount and FTE enrollment levels for the System over the past decade. Although there have been year-to-year fluctuations, the FTE enrollment level in 1995-96 was virtually the same as for 1986-87. Headcount enrollment, on the other hand, has increased by over 21 percent during the same period. That is, the headcount-related workload in the instructional and administrative support area has grown more rapidly than has been recognized by the FTE-driven funding model.

## *3.6 Recommendation*

We recommend that the current rates used in the instructional and administrative support formula be re-calibrated to reflect the national expenditure patterns and the growth in workload. This should be accomplished as shown in Exhibit 3-7, where the line labeled "proposed NC formula" has been created to pattern the economy of scale experience found in the other 49 states. The base point for the proposed formula has been shifted from 750 to 500 FTE students, to conform with the "small college" definition used in the instructional formula.

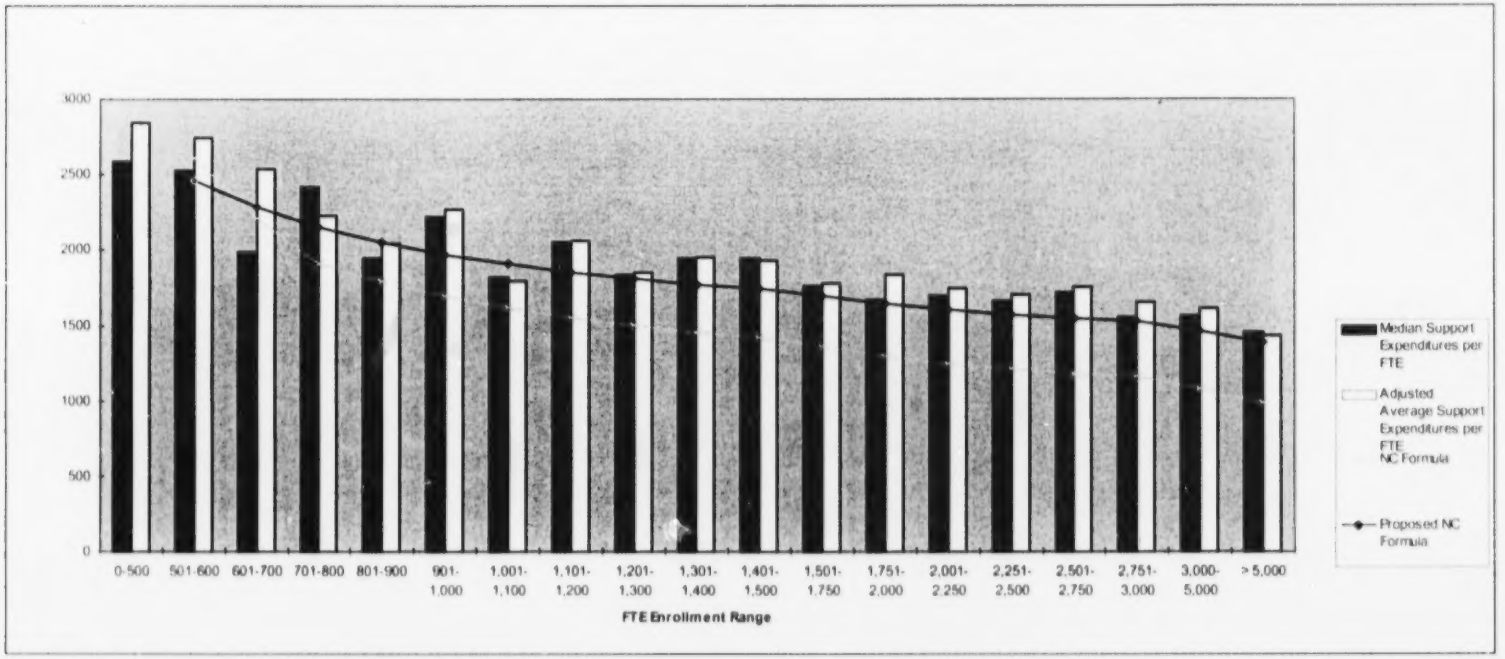
**EXHIBIT 3-6**
**PERCENTAGE CHANGE IN UNDUPLICATED HEADCOUNT AND FTE ENROLLMENT**
**COMPARED TO 1986-87**
**NORTH CAROLINA COMMUNITY COLLEGE SYSTEM**




| | 1986-87 | 1987-88 | 1988-89 | 1989-90 | 1990-91 | 1991-92 | 1992-93 | 1993-94 | 1994-95 | 1995-96 |
|---|---|---|---|---|---|---|---|---|---|---|
| Unduplicated Headcount | 641,972 | 624,813 | 662,255 | 741,387 | 754,500 | 752,477 | 760,537 | 739,813 | 758,545 | 779,956 |
| Percentage Annual Change | - | -2.67% | 5.99% | 11.95% | 1.77% | -0.27% | 1.07% | -2.72% | 2.53% | 2.82% |
| Percentage Change from 1986-87 | | -2.67% | 3.16% | 15.49% | 17.53% | 17.21% | 18.47% | 15.24% | 18.16% | 21.49% |
| FTE | 126,368 | 116,289 | 120,435 | 126,929 | 131,597 | 138,513 | 137,929 | 129,877 | 127,762 | 126,553 |
| Percentage Annual Change | - | -7.98% | 3.57% | 5.39% | 3.68% | 5.26% | -0.42% | -5.84% | -1.63% | -0.95% |
| Percentage Change from 1986-87 | | -7.98% | -4.70% | 0.44% | 4.14% | 9.61% | 9.15% | 2.78% | 1.10% | 0.15% |

Source: Headcount - Table 3 Annual Statistical Report 1995-96 FTE - Table 14 Annual Statistical Report 1995-96

## EXHIBIT 3-7
## SUPPORT EXPENDITURES PER FTE BASED ON FTE ENROLLMENT RANGES
## MEDIAN, ADJUSTED AVERAGE, NC FORMULA, AND PROPOSED NC FORMULA




Note: Does not include North Carolina or Kentucky 2 year public schools (data not available for Kentucky).
Adjusted average corrects for observations in national population with erroneous data.
NC Schools less than 500 FTE, support amount is negotiated, not formula driven.
NC Formula is based on midpoint of range, 7,500 was used for > 5,000 range.
NC Formula is a base of $89,981 for president's salary, and $1,345,065 for the first 750 FTE and $889 for each FTE > 750.
NC Adjusted Formula is a base of $89,981 for president's salary and $1,200,000 for the first 500 FTE and $1,300 for each FTE > 500.
Source: NCES 1994-95 IPEDS.

We estimate that this modification could require nearly $50 million to implement. In recognition of the other priorities of the State Board for the System, we recommend that this formula change be phased-in at a rate of approximately $10 million per year over the next 5 years.

# 4.0 NEXT STEPS

## 4.0 NEXT STEPS

The Phase 1 report listed a number of issues that were recommended for additional study and consideration by the State Board of Community Colleges as it continues to enhance the funding methods used by the System. This supplemental (or Phase 2) report has addressed only on the economy of scale issues that were known to be of significant concern to state leaders and which might have impact on the 1997-98 appropriation, and has left the remaining issues for later consideration.

The following topics continue to be of potential interest in the ongoing efforts of the Formula Study Advisory Committee as it carries out its responsibilities:

- determination and formula recognition of differences in the costs of delivering different types of curriculum instruction programs,
- evaluation of alternative approaches for providing a balance between budget responsiveness and stability arising from changes in FTE enrollment due to the semester conversion and demographic trends,
- evaluation of the merits of considering headcount as well as FTE enrollment in the formula for instructional and administrative support,
- determination of the unique costs encountered by colleges which offer significant levels of programs at more than one location, and
- development of techniques for justifying the need for and allocating resources for equipment replacement.

Additionally, the Committee should investigate the opportunity to incorporate additional performance or incentive funding concepts in the System's funding models.

## *APPENDIX:*

## *SELECTED EXCERPTS FROM PHASE I REPORT*

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# 6.0 RECOMMENDATIONS

## 6.1 Priorities

In offering our recommendations for refinement of the current community college funding model, we have elected to focus on a limited number of concerns. The Formula Study Advisory Committee urged, and we concur, that the System's efforts related to refinement of the funding model should address a relatively small number of major issues rather than consider every individual topic that might be of concern to one or more of the stakeholders. The fact that the current model is basically sound supports the decision to focus on a limited number of concerns. Our recommendations address:

- the need for a simplified budget structure,
- the enhancement of funding rates for occupational extension,
- a modification in the approach used to fund basic skills / literacy,

*(remainder of this section not included in excerpt)*

## 6.2 Simplified Structure

An overarching general recommendation is to streamline the funding model wherever practicable. We found that participants in our regional meetings frequently mentioned their inability to understand the various components of the current formula. Many felt there would be greater support for the current model if only more college officials understood its workings.

We believe a high priority should be placed on enhancing how the current and revised formulas are displayed. We believe there are many opportunities for changes in the organization of the formula documents, greater use of common terminology, consolidation of categories, and similar techniques that can add to the clarity of the

formula presentation with minimal, if any, unintended impact on how funds are distributed among the colleges. The more specific recommendations that follow will be guided by the goal of adoption of a simplified structure for presenting the financial needs of the System.

### *6.3 Occupational Extension*

The funding model for occupational extension was the specific focus of the special provision calling for the formula study. Given the mission of the colleges related to workforce development and the testimony we heard about the current inadequate funding arrangements, we recommend that occupational extension programs be funded in a manner similar to that used for curriculum instruction programs. In particular, we believe that the formula for occupational extension should include:

- a sliding scale to calculate instructional units required, with:
  - a staffing ratio of 17.8:1 for the first 500 FTE students, and
  - a staffing ratio of 21.55:1 for enrollment beyond 500 FTE
- the same value per instructional unit as curriculum instruction,
- the same treatment of fringe benefits as curriculum instruction, and
- the same rate per FTE student for other costs.

Any subsequent changes in the funding model for curriculum instruction, furthermore, should also apply to occupational extension in order to maintain parity.

Preliminary analyses suggest that the cost of full implementation of this recommendation may require a several year phase-in period. We recommend that the proposed staffing ratios be calibrated during the phase-in period to match funding availability.

We believe that the concern expressed about a potentially disproportionate share of occupational extension funding going to one or more colleges ignores the fact that

these colleges deliver a disproportionate share of the System's extension programming. Implementation of the recommendation for funding parity between curriculum instruction and occupational extension should contribute to the ability of all colleges in the System to assume a more proportionate role in providing this type of service to their local communities.

### *6.4 Basic Skills/Literacy*

We believe that two major changes in the funding model for basic skills/literacy are warranted. First, we recommend that funding for basic skills/literacy also be funded at parity with curriculum instruction. Although the variance in current funding rates between curriculum instruction and basic skills/literacy when compared on a dollars per annual FTE basis, is not as great as that for occupational extension, we suspect that the lower funding rates contribute to the relative lack of emphasis on these programs by some colleges.

Our second recommendation in the basic skills/literacy area is for a streamlined calculation for workload that follows the general format used for the curriculum instruction formula. The current performance incentives for GED and adult high school diploma should be continued as the first step in developing a performance funding component of the overall model. Any subsequent changes in the funding model for curriculum instruction should also apply to the basic skills/literacy formula.

*(remainder of chapter not included in this excerpt)*